

High Altitude Small Unmanned Aircraft Systems

Completed Technology Project (2017 - 2018)



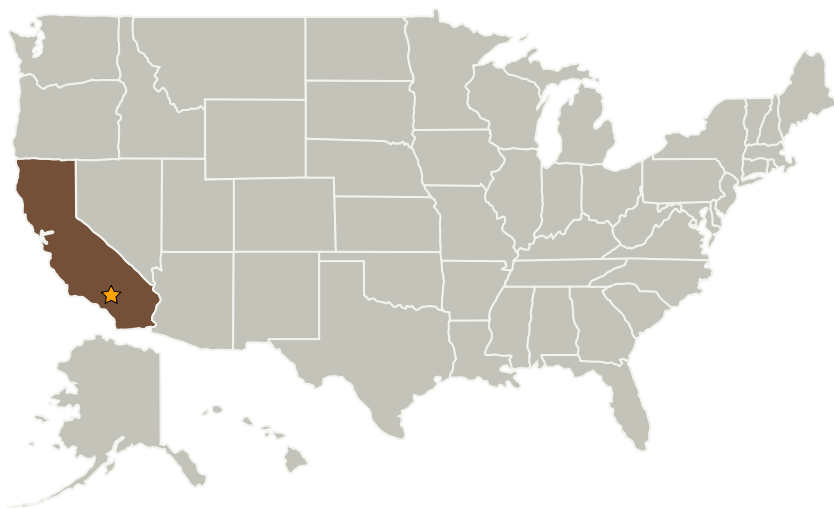
Project Introduction

Innovation in the project includes designing for the smallest viable airplane, using rapid prototyping technologies, using low cost commercial UAS technologies with modification, using low cost testing and development methods, and use of academic partnerships. Key technical challenges include designing an extremely low Reynolds number glider, fitting the required avionics and telemetry equipment in a cube-sat sized airplane, and ensuring all equipment survives the harsh environment of the high altitude testing conditions. This project uses an iterative, build-up approach and reduces the largest technical risk items as it moves towards a high altitude proof of concept demonstrator. One deliverable for this year is to complete a fully integrated environmental chamber test in a flight relevant environment. Following this milestone, the project will proceed with a series of balloon launched altitude tests culminating in a Mars relevant density high altitude aerodynamic characterization flight test.

Anticipated Benefits

The goal of this project is to demonstrate the feasibility and characterize the performance of a low Reynolds, high altitude, navigable subsonic glider. There is currently a gap, both on Earth and on Mars, in this regime. Weather balloons are not navigable, ground based vehicles cannot cover as much range or perform direct atmospheric measurements. Satellites perform remote sensing only and have fidelity limitations for the area of interest due to distance.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
California Polytechnic State University-San Luis Obispo(Cal Poly)	Supporting Organization	Academia	San Luis Obispo, California
University of California-Riverside	Supporting Organization	Academia Asian American Native American Pacific Islander (AANAPISI), Hispanic Serving Institutions (HSI)	Riverside, California

Primary U.S. Work Locations

California

Project Website:

https://www.nasa.gov/directorates/spacetech/innovation_fund/index.html#.VC

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Center Innovation Fund: AFRC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

David F Voracek

Principal Investigator:

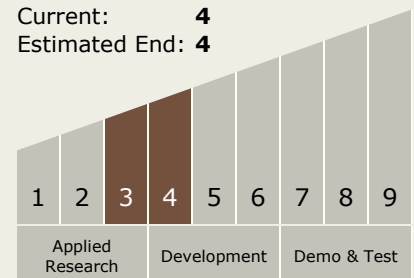
David E Berger

Technology Maturity (TRL)

Start: 3

Current: 4

Estimated End: 4



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.3 Human Health and Performance
 - └ TX06.3.2 Prevention and Countermeasures

Target Destinations

Earth, Mars